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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,180	11/14/2003	Peter C. Rieke	50005-162	9390

32215 7590 05/13/2008

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EXAMINER	
LEWIS, BEN	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
05/13/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,180	RIEKE ET AL.	
	Examiner	Art Unit	
	Ben Lewis	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *February 5th 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39,96-101 and 103-132* is/are pending in the application.

4a) Of the above claim(s) *96-101,103-108,110 and 111* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-39 and 115-132* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Newly submitted claim 129 and its dependent claims are directed to an invention that is independent or distinct from invention originally claimed for the following reasons:

Invention of claim 129 and its dependent claims and the original claims examined are related as product and process of using that product. The inventions are distinct if it can be shown that either: (A) the process of using as claimed can be practiced with another materially different product; or (B) the product as claimed can be used in a materially different process (MPEP § 806.05(h)). In this case as admitted in the subject matter of the present claims the process of producing electrical energy can be practiced by four different products as claimed by Applicant.

Since the applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 129 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP 821.03.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2-3, 21-22 and 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claims 2-3 and 21-22 recites the limitation "B-site atoms". There is insufficient antecedent basis for this limitation in the claim.

4. Claim 38 recites "a system for utilizing electrical energy produced by said fuel cells" this limitation does not further limit claim 38 since this claim is directed to a fuel cell assembly which excludes auxiliary components.

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6 Claim 17, 36 and 126 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed,

had possession of the claimed invention. The recitation of "said cathode layer comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material" in claims 17 and 36 is not present in the specification as originally filed.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-7, 9-10, 15-16, 18-19, 20, 23-25, 26, 28-29, 34 and 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Forthmann et al. (Ceramic coatings for cathode contacts of solid oxide fuel cells, Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999), Meeting Date 1998, 149-154.)

With respect to claims 1 and 4, 5, 6, 15, 16, 18, 20, 23, 24, 25, 34, 35, 37 Forthmann et al. disclose a planar solid oxide fuel cell characterized by 2 porous electrodes and a gas impermeable solid electrolyte. Forthmann et al., also discloses a cathode material for a solid oxide fuel cell that produces electricity by electrochemically reacting a fuel gas with an oxidant gas to produce a DC output voltage, said solid oxide

fuel cell comprising a layer of ceramic ion conducting electrolyte defining first and second opposing surfaces, said electrolyte comprising a zirconium-containing material; a conductive anode positioned is inherently in contact with the first surface of said electrolyte layer; and a conductive cathode positioned in contact with the second surface of said electrolyte layer, said cathode comprising a modified lanthanum ferrite perovskite material; wherein said modified lanthanum ferrite perovskite material is in direct contact with said zirconium-containing material; and wherein said fuel cell includes a cathode contact layer of a perovskite composition having the formula: $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract)

With respect to claims 2 and 21, Frothmann et al. teach that the fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Therefore the copper is present at 4 atomic percent. Examiner notes that copper is a B-site atom in the LASK formula of Frothmann et al.

With respect to claim 3, 7, 22 and 26, Frothmann et al. teach that the fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Therefore the copper is present at 4 atomic percent. 4 atomic percent reads on “about 5 atomic percent.” Examiner notes that copper is a B-site atom in the LASK formula of Frothmann et al.

With respect to claims 9-10 and 28-29, Forthmann et al. disclose a planar solid oxide fuel cell characterized by 2 porous electrodes and a gas impermeable solid electrolyte. The fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}$ $Sr_{0.4}$ $Fe_{0.8}$ $Cu_{0.2}$ O_3 (See Abstract).

The instant specification recites: The perovskite crystal structure of an A-site and B-site-substituted lanthanum ferrite perovskite is represented by the general formula: La_{1-x} A_x B_y Fe_{1-y} O_3. See Page 11, Lines 20-22. Forthmann et al do not disclose any polarization resistance data. However, it is the position of the examiner that such properties are inherent, given that Forthmann et al and the present application utilize the same copper-substituted lanthanum ferrite material. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

With respect to claim 19 and 39, Forthmann et al. teach that the (LASK) $La_{0.6}$ $Sr_{0.4}$ $Fe_{0.8}$ $Cu_{0.2}$ O_3 were sintered onto the interconnectors of the fuel cell stack (See abstract).

With respect to claim 19 and 38, Forthmann et al. teach interconnects with gas passages (See Fig. 2).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 12, 31, 121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forthmann et al. (Ceramic coatings for cathode contacts of solid oxide fuel cells, Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999), Meeting Date 1998, 149-154.) in view of Seabaugh et al. (U.S. Pub. No. 2003/0003237A1).

With respect to claims 12 ,31 and 121, Forthmann et al. disclose a solid oxide fuel cell above. Forthmann et al. do not specifically teach an interlayer between said electrolyte layer and said cathode layer. However, Seabaugh et al. disclose a ceramic electrolyte coating (title) wherein there are also advantages of applying interlayer films between the porous support electrode plate (either the LSM cathode or the NiO/YSZ anode) and the deposited electrolyte (YSZ) film. The purpose of such interlayer films could be either to increase performance (e.g. by incorporating catalytic materials that enhance electrochemical reactions or by locally reducing the size of particles and pores so that the density of electrochemical reaction sites is increased), or to prevent adverse

chemical reactions between the support electrode and deposited film during sintering or co-sintering (Paragraph 0015). Therefore it would have been obvious to incorporate the interlayer of Seabaugh et al. into the fuel cell system of Forthmann et al. because Seabaugh et al. teach that The purpose of such interlayer films could be either to increase performance (e.g. by incorporating catalytic materials that enhance electrochemical reactions or by locally reducing the size of particles and pores so that the density of electrochemical reaction sites is increased), or to prevent adverse chemical reactions between the support electrode and deposited film during sintering or co-sintering (Paragraph 0015)

11. Claims 13-14, 33-33, 122 and 123 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forthmann et al. (Ceramic coatings for cathode contacts of solid oxide fuel cells, Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999), Meeting Date 1998, 149-154.) in view of Badding et al. (U.S. Pub. No. 2001/0044041 A1).

With respect to claims 13-14, 33-33, 122 and 123, Forthmann et al. disclose a solid oxide fuel cell above. Forthmann et al. do not specifically teach wherein the copper substituted ferrite material comprises a layer having a thickness from about 1 tro 50 microns or having a thickness from about 1 to 30 microns. However, Badding et al. disclose high performance solid oxide electrolyte fuel cells (title) wherein With more

conventional perovskite-type electrode materials such as $La_{0.85}Sr_{0.15}MnO_3$, or other manganites, electrode resistivity is typically about 10.sup.-2 ohm-cm, or essentially 3 orders of magnitude higher than the resistivities of precious metal-containing electrodes. In these cases the electrode designs generally involve smaller electrodes with shorter current path lengths (as low as 2 mm), higher electrode thicknesses, (>20 microns), and/or highly conductive current collectors in contact with the electrodes. Electrodes less than around 20 microns in thickness, however, are generally preferred for minimizing material usage and enhancing the flexibility and thermal shock resistance of the electrode/electrolyte structure (Paragraph 0056). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the electrode thickness of Badding et al. for the cathode thickness of Frothmann et al. because Badding et al. teach that Electrodes less than around 20 microns in thickness, however, are generally preferred for minimizing material usage and enhancing the flexibility and thermal shock resistance of the electrode/electrolyte structure (Paragraph 0056).

12. Claims 115-120, 124, 125 and 127, 128 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forthmann et al. (Ceramic coatings for cathode contacts of solid oxide fuel cells, Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999), Meeting Date 1998, 149-154.)

With respect to claim 115, 118, 119, 124, 125 and 127, Forthmann et al. disclose a planar solid oxide fuel cell characterized by 2 porous electrodes and a gas impermeable solid electrolyte. The fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Forthmann et al. also disclose perovskite $La_{0.6}Sr_{0.4}Fe_{0.8}Ni_{0.2}O_3$ (LSFN) (See page 150). Examiner notes the B site atom is Ni in (LSFN). Examiner also notes that Frothmann et al. also disclose perovskite LSM where the B site atom is Mn. Examiner also notes that Frothmann et al. disclose LSFC where the B site atom is Co (See page 150). The Frothmann reference does not teach a copper-substituted lanthanum ferrite perovskite material that includes at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum, chromium, however based on the teachings of manganese, nickel, and cobalt as B-site atoms by Frothmann et al., one of ordinary skill in the art would be motivated at the time the invention was made to use manganese, nickel and cobalt as a B-site dopant in the copper substituted lanthanum ferrite perovskite material as taught by Frothmann et al.

With respect to claims 116, Frothmann et al. teach that the fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Therefore the copper is present at 4 atomic percent. Examiner notes that copper is a B-site atom in the LASK formula of Frothmann et al.

With respect to claim 117, Frothmann et al. teach that the fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Therefore the copper is present at 4 atomic percent. 4 atomic percent reads on "about 5 atomic percent." Examiner notes that copper is a B-site atom in the LASK formula of Frothmann et al.

With respect to claims 120, Forthmann et al. disclose a planar solid oxide fuel cell characterized by 2 porous electrodes and a gas impermeable solid electrolyte. The fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract).

The instant specification recites: The perovskite crystal structure of an A-site and B-site-substituted lanthanum ferrite perovskite is represented by the general formula: $La_{1-x}A_xB_yFe_{1-y}O_3$. See Page 11, Lines 20-22. Forthmann et al do not disclose any polarization resistance data. However, it is the position of the examiner that such properties are inherent, given that Forthmann et al and the present application utilize the same copper-substituted lanthanum ferrite material. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. In re Robertson, 49 USPQ2d 1949 (1999).

13. Claims 130-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forthmann et al. (Ceramic coatings for cathode contacts of solid oxide fuel cells, Werkstoffwoche '98, Band III: Symposium 3, Werkstoffe fuer die Energietechnik; Symposium 7, Werkstoffe und Korrosion, Munich, Sept., 1998 (1999), Meeting Date 1998, 149-154.)

With respect to claim 130-132, Forthmann et al. disclose a planar solid oxide fuel cell characterized by 2 porous electrodes and a gas impermeable solid electrolyte. The fuel cell cathode contact layer comprised a perovskite (LASK) $La_{0.6}Sr_{0.4}Fe_{0.8}Cu_{0.2}O_3$ (See Abstract). Forthmann et al. also disclose perovskite $La_{0.6}Sr_{0.4}Fe_{0.8}Ni_{0.2}O_3$ (LSFN) (See page 150). Examiner notes the B site atom is Ni in (LSFN). Examiner also notes that Frothmann et al. also disclose perovskite LSM where the B site atom is Mn. Examiner also notes that Frothmann et al. disclose LSFC where the B site atom is Co (See page 150). The Frothmann reference does not teach wherein the electrolyte layer comprises a yittria-stabilized zirconium oxide, however Applicant teaches that Solid oxide fuel cells (SOFCs) employing a dense ceramic electrolyte are currently considered as one of the most attractive technologies for electric power generation. In a typical SOFC, a solid electrolyte separates the porous metal-based anode from a porous metal or ceramic cathode. Due to its mechanical, electrical, chemical and thermal characteristics, yttria-stabilized zirconium oxide (YSZ) is currently the electrolyte material most commonly employed. (Page 2 Applicant's Specification). Examiner notes that due to Applicants own admission of the use of yttria-stabilized zirconium oxide (YSZ) as an electrolyte material being well known in the fuel cell art it would have been

obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of (YSZ) as an electrolyte material in the fuel cell of Forthmann et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ben Lewis/
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795